

Monitoring Environmental Benefits for Aggregated Small Forest Landowners



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Deliverables:

1. Analysis of existing forest carbon, water quality, and other environmental services protocols as they apply to small landowner groups.
2. Monitoring tool to scientifically determine what variables to measure in what locations and in what intensity to meet monitoring requirements for different ecosystem services programs.
3. Written instruction manual and curriculum to explain the monitoring process, and guidance on how to apply monitoring data to improve forest management when criteria are not met.
4. Stakeholder review process for monitoring tools developed.
5. A series of workshops to educate forestry professionals, landowners, and community groups about ecological monitoring.
6. A piloted field test of Forest Stewardship Council and environmental service monitoring on ten small forests.
7. Advancement of an aggregated small landowner group option in existing ecosystem services market protocols.

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Executive Summary

Forests owned by private individuals and families represent more than a third of the forestland in the United States. Together they provide important public good benefits such as water quality, carbon sequestration, and biodiversity. However, these forests in particular are at risk of poor management or conversion to non-forest uses. Incentive programs to manage for ecosystem services are important means to keep forestland as forest, but these developments have been limited in their applicability to small forest owners. There is a need not only for mechanisms that facilitate small owner participation in such ecosystem services markets, but also for tools that help forest owners evaluate the ecosystem benefits that may be generated on their properties.

This Conservation Innovation Grant enabled Northwest Natural Resource Group (NNRG) and its partners to build on previous advancements in small forest owner aggregation and resource development to address these needs. Project tasks included the following:

- Analysis of existing carbon, water quality, and other environmental services monitoring protocols and data collection needs as they relate to small landowner groups;
- Adaptation of existing protocols and development of new monitoring tools for small landowners/aggregated groups;
- Stakeholder review of new monitoring tools and field-testing with forest producers; and
- Dissemination of monitoring protocols and results to stakeholders through outreach and workshops.

As a result of this project, three white papers, two new monitoring tools, and supporting manuals and guides were developed and disseminated to small forest owners. These resources provide a framework for a number of conclusions. For example, carbon offsets currently represent the most accessible ecosystem services market for small forest owners, but current carbon credit prices limit participation to landowners with 500 acres or more given current transaction costs. Other types of markets are less relevant for this landowner group, although future opportunities may arise through water quality trading and riparian management. Despite limited markets, measuring and monitoring ecosystem benefits is important to develop baseline conditions and inform future management. This project advanced various monitoring tools that can be used by small forest owners on their lands, including a carbon calculator and biodiversity assessment.

This project has contributed to small forest owner participation in ecosystem services markets in important ways, but more work is yet to be done. Perhaps most importantly, ecosystem services markets are not yet robust enough to cover participation costs for small private landowners. NNRG and its partners will continue to build on the work accomplished by this grant, and provide crucial resources to small forest owners to inform their land management.

Introduction

Programs that incentivize improved private land management based on ecosystem services are being developed across the country. However, a key obstacle to small landowner participation in these programs is the lack of cost effective, yet rigorous monitoring and verification of environmental benefits at the small scale. The objective of this project was to address this barrier by developing standardized protocols for monitoring environmental services performance and certification conformance across groups of aggregated small forest landowners.

Ecosystem monitoring protocols and tools have national applicability for small forest landowner groups. This project focused on approximately 160 small forest owners in Washington and Oregon who are members of NNRG's Northwest Certified Forestry (NCF) program, who represent over 60,000 acres of forestland. NCF members are at the forefront of sustainable forest management, and are prime candidates for participating in environmental services and certification markets.

To serve the needs of these forest owners, this project brought together partners with recognized expertise in small landowner issues, forest certification, carbon offset markets, water quality and environmental services bundling. Together these partners represent regional and national expertise in environmental markets, protocol development and landowner aggregation.

Northwest Natural Resource Group (NNRG) experienced some change in personnel during the course of this project. At the completion of the project, key personnel included:

- Dan Stonington, NNRG Executive Director
- Kirk Hanson, Director of Northwest Certified Forestry, NNRG
- Lindsay Malone, Director of Member Services, NNRG
- Bobby Cochran, Executive Director for Willamette Partnership
- Nicole Maness, Ecosystem Services Project Manager, Willamette Partnership
- Gary Dodge, Director of Science and Certification for FSC US
- Paula Swedeen, President of Swedeen Consulting
- Steve Ruddell, President of Carbon Verde, LLC

Background

For over 17 million acres of private forestland in Washington State and 12 million acres in Oregon, conversion to non-forest use continues to threaten wildlife habitat, carbon sequestration, and other valuable services provided by the forested landscape. For these private lands to be environmentally and economically viable, it is essential to both understand their collective impacts on environmental benefits and have tools to measure those contributions. This is especially true for smaller non-industrial lands at the highest risk of poor management or conversion to non-forest use.

Across the country, ecosystem services markets are being developed and applied to provide incentives for improving private land management and the ecological benefits derived from them. For example, the Climate Action Reserve, Verified Carbon Standard, and American Carbon Registry offer protocols for voluntary carbon offset projects, and the Willamette Partnership continues to advance metrics for quantifying benefits from wetlands, salmon habitat, upland prairie habitat, and water quality. Third-party forest certification standards such as the Forest Stewardship Council™ (FSC®) naturally complement such ecosystem services programs by encouraging sustainable forest management.

One of the main barriers to accessing these incentives for small landowners is the lack of cost effective yet rigorous monitoring and verification at the small scale. Many small landowners lack the knowledge to perform these requirements themselves, and are unable to afford assistance. Existing monitoring protocols in many environmental services markets effectively exclude small landowners from participating due to high fixed monitoring and verification costs and little or no allowances for aggregation of small landowner contributions. In recent years progress has been made to measure and monetize these environmental services, but few programs have been readily accessible to the patchwork of small landowners that make up much of America's urban-wildland interface and provide a buffer to the more permanently protected federal and state lands.

NNRG's development of NW Neutral, a program and protocol for measuring carbon sequestration on small FSC-certified forestland, was a step in this direction. The program piggybacked onto NNRG's pioneering group FSC certification program to allow many small landowners to participate at lower cost to access both certified wood markets and carbon offset markets. During its pilot phase, NNRG successfully sold carbon offsets at \$20/ton for two forest landowners on a voluntary basis. The experience gained through developing NW Neutral provides the foundation for expanding monitoring tools and protocols for aggregated small forest landowners.

Small privately owned forests make up more than a third of all forestland in the United States. The role these lands play in serving as carbon sinks and providing clean water and wildlife habitat necessitates that small landowners not be overlooked or excluded from regional environmental discussions or incentive programs. It is essential that viable sustainable forestry on a small scale become an economic reality, as high real estate prices and land fragmentation threaten conversion of these lands to non-forest uses. Environmental services markets or incentive programs for best management practices can provide this needed income only if ecosystem benefits can be measured efficiently at the small or aggregated scale, and if land managers have the tools to do so. This project aimed to address this gap.

Review of Methods

The objectives of this project were met using an iterative process that included analyzing existing monitoring protocols and tools, developing new material relevant to small forest

landowners, reviewing and field testing new material, and incorporating feedback into disseminated information and stakeholder resources. These methods included the following:

1. *Conduct a review of monitoring protocols and data collection needs (based on best available science) for carbon, water quality, biodiversity, FSC certification and other relevant environmental services for small forest landowners.*

This review first focused on carbon offset markets where protocols are most highly developed, including the Verified Carbon Standard, Climate Action Reserve, Western Climate Initiative, and American Carbon Registry. Further analysis examined various water quality trading protocols for forest landowners (e.g., temperature and nutrient loading) and wildlife habitat protocols (e.g., Willamette Partnership's Counting On The Environment program). Project consultants conducted these reviews through research of peer-reviewed literature and websites, and through limited phone interviews. These reviews produced three white papers summarizing results.

2. *Survey aggregation protocols for forest certification and environmental services.*

Currently there are existing aggregation protocols for small landowners within most carbon offset protocols and some water quality projects. However, the applicability, use, and accessibility of these models is highly variable and most have not resulted in actual aggregation projects on the ground. Project partners approached this review from both an effectiveness standpoint in measuring environmental services benefits for small landowners, and from a landowner perspective to establish protocol recommendations that are accessible and cost effective for small ownerships. Group forest certification was also examined in this context as an aggregation model. Results from this activity were captured in project white papers.

3. *Develop sampling criteria/methods and a data collection tool for properties in an aggregated landowner system for various potential environmental services.*

Maintaining appropriate continuity for scale and unit of analysis can be difficult. For example, carbon is measured based on a biomass inventory at the stand level, while water temperature credits are based on 100-ft stream intervals. This step involved determining the necessary variables and plot densities for FSC certification monitoring, and assessing what additional environmental services can be cost-effectively included in certification monitoring. Results were incorporated into the forest inventory tools, the biodiversity monitoring tools, and the overall monitoring guidelines.

4. *Develop training and workshop curriculum, and participate or conduct educational workshops for forestry professionals and small landowners.*

Initially the project goal was to host three two-day workshops to meet these ends. However, to reach a broader audience, this evolved into six shorter workshops and/or educational events in both Oregon and Washington. NNRG collaborated with Oregon State University Extension, the Willamette Partnership, and Washington State University Extension to coordinate events and provide outreach to a range of participants.

5. *Conduct a field trial of new data collection tools across ten different small forests.*

Ten small landowners were recruited to participate in this project to field test the new monitoring protocols. Participant feedback on the tools' environmental applicability, scientific rigor, and ease of use was incorporated into updated versions of the material.

6. *Disseminate results to small forest landowners, and advance aggregation protocols in existing environmental services markets.*

NNRG updated its website, resource materials, and standard operations to incorporate project results. NNRG and its partners have also worked to promote results among policy makers, and continue engagement with opportunities to aggregate forest owners in ecosystem services markets.

Quality Assurance

The results produced by this project were designed to be accessible to small forest owners and the natural resource professionals who work with them. As such, quality assurance was determined based on this utility. Monitoring tools for carbon and biodiversity were vetted by project partners, and then field tested by small forest owners. The biodiversity assessment tool in particular underwent multiple iterations of refinement with the input of both project partners and landowners, with an objective to be both scientifically sound and simple to use. We are confident that this iterative process has contributed to quality tools that are useful for landowners.

Findings

The following deliverables resulted from this project:

1. Three white papers have been completed that assess existing forest carbon, water quality, and other ecosystem services protocols as they apply to small forest owners.
 - a. *Ecosystem Services Protocols for Use on Forestlands in Western Washington and Oregon* provides an overview of the various protocols for such ecosystem services as water quality, wildlife, and habitat and highlights existing or developing markets available to forest landowners in western Washington and Oregon. The Willamette Partnership developed this paper, building on their Counting on the Environment (COTE) project and work on water quality trading in the Tualatin River Basin. The paper provides a comprehensive review of the ecosystem service markets that are currently available to forest landowners. At present, markets with direct payments for forest landowners are limited to carbon offset programs. Developing ecosystem market programs may include historic prairie restoration in Washington's South Puget Trough, and riparian mitigation along Oregon's North Coast, Willamette River tributaries, and Rogue River Valley.
 - b. *Monitoring for Forest Carbon Under Third Party-Verified Carbon Offset Programs* was developed by Swedeen Consulting, and reviews three major third-party verified forest offset programs in the United States for data and monitoring requirements: the Climate Air Resources Board/Climate Action Reserve

(ARB/CAR), the Verified Carbon Standard (VCS), and American Carbon Registry (ACR). Each standard has high inventory accuracy requirements, annual monitoring reporting, and high third-party verification costs. Aggregating landowners can reduce inventory and cost burdens for landowners, but opportunities for small landowners depend on the price for carbon offset credits. Smaller projects generate less revenue; the author recommended individual landowners have at least 500-1,000 acres each to defray participation costs. The author also identified the American Carbon Registry as the most cost-effective protocol for monitoring aggregated small woodland owners based on ACR's fee structure for individual and grouped landowners.

- c. *Monitoring Biodiversity on Small Forest Lands* was also developed by Swedeen Consulting, and documents the use of forest measurements like structure and spatial variability as a proxy to assess forest biodiversity value at a stand level. Reasonable accuracy can be obtained with a plot per acre sampling similar to most major carbon offset programs, with decreased costs if paired with a preexisting timber cruise. Less rigorous data collection may be preferred in some circumstances, e.g., for cost-share programs, voluntary credit programs, or documenting FSC compliance. In these cases, rapid or visual assessments of forest conditions can be conducted on a more qualitative basis.
2. Two monitoring tools have been developed to aid small forest owners in measuring ecosystem benefits from their land.
 - a. *Carbon Biomass Baseline Calculator*: Swedeen Consulting tested and finalized the carbon calculator to be used alongside NNRG's existing forest inventory tool. Field data collected during the forest inventory is processed using the calculator to generate an estimate of carbon biomass storage. The calculator can be used to project how forest management will influence future carbon storage, from which the cost effectiveness of various carbon offset programs can be assessed.
 - b. *Biodiversity Assessment*: NNRG collaborated with World Wildlife Fund Sweden and FSC US to modify a globally-used 60-criteria field form to assess Pacific Northwest forest conservation values and biodiversity. The biodiversity assessment tool was developed for four key ecosystem types in Washington and Oregon: Douglas-fir/mixed conifer forests west of the Cascades; Oak/Douglas-fir woodlands; Early seral forest conditions; and Ponderosa pine/mixed conifer forests east of the Cascades. The tool's primary utility is its ease of use for forest owners and comprehensive content. The biodiversity assessment form underwent multiple iterations of field trials, review, and updating (see number 4 below), and is now being incorporated into regular NNRG interactions with members.
3. Three written instruction manuals have been developed or updated for use alongside other materials generated from this project, in addition to two short supplemental guides.
 - a. *Tools to Monitor Ecosystem Services* was developed to provide a basic framework for landowners and foresters to collect metrics required for participation in FSC certification and emerging ecosystem services markets. The

- manual provides information on forest inventories, carbon calculation, harvest assessments and biodiversity assessments.
- b. *Conducting a Forest Biodiversity Assessment* is a comprehensive tutorial for use with the biodiversity assessment forms.
 - c. *Forest Inventory and Monitoring Guidelines* is a fundamental manual developed previously for NNRG members, and includes basic instructions for how to conduct monitoring for forest inventories, road and stream assessments, and other key forest attributes. This guidebook was updated to include the biodiversity assessment and carbon calculators.
 - d. The *Family Forest Monitoring Flow Chart* ties all of the various monitoring tools together, and informs landowners when to monitor what according to site conditions and activities.
 - e. The *Family Forest Monitoring Table* is a simple spreadsheet comparing the various monitoring tools in terms of their purpose, applicable ecosystem, type of data collection, and measured variables. It is meant as a quick reference for forest owners to understand the differences between tools and when to use them.
4. Stakeholder review of developed monitoring tools. NNRG solicited input from multiple partner organizations and individuals to continue to refine monitoring tools in development. These stakeholders included Willamette Partnership, FSC US, World Wildlife Fund Sweden, Portland State University, Ecotrust, the Bullitt Foundation, Earth Economics, and Defenders of Wildlife.
 5. A series of six workshops and educational events were completed to educate forestry professional, landowners, and community groups about the importance of ecological monitoring and how to use monitoring tools.
 - a. On March 22nd, 2014, Amy Grotta of Oregon State University Extension Services gave a workshop at Oregon Tree School on using the biodiversity assessment tool, with thirty landowners in attendance.
 - b. Dan Stonington and Kirk Hanson distributed printed copies of the monitoring tools and guidebooks and engaged landowners in opportunities to implement the tools at the Community Forest Conference on May 5th and 6th 2014, a gathering of conservation organizations and other partners to discuss community ownership and management of forestlands in the Pacific Northwest Region.
 - c. NNRG staff distributed monitoring tools and guidebooks at two forestry field days hosted by Washington University Extension, engaging participating landowners and natural resource professionals about NNRG programs and monitoring in forests. North Sound Field Day was July 26th 2014 in Arlington, WA, and the Western Washington Field Day was August 9th 2014 in Salkum, WA.
 - d. NNRG and the Willamette Partnership co-hosted a workshop on oak restoration and monitoring in Dallas Oregon on July 31st 2014. A mix of thirty private landowners, natural resource professionals, and governmental agency staff were in attendance.

- e. On October 19th 2014, Kirk Hanson conducted a workshop on Orcas Island in the San Juan Islands archipelago, where he discussed ecosystem services monitoring within the context of active management for forest health. The biodiversity assessment tool was introduced as a tool to identify either areas of high diversity that should be conserved, or areas of low diversity that can benefit from management. Twenty individuals were in attendance.
6. Ecosystem services monitoring, including both the biodiversity assessment tool and carbon calculations, was piloted on ten forest owner sites. Feedback from these site visits was incorporated into future versions of the biodiversity assessment form. The ten sites (all EQIP-eligible) are listed below.

Name	Owner	City, State	Acreage
Weber Family Forest	Brian Weber	Morton, WA	80
Findlay Family Forest	Mark & Kitty Findlay	Langley, WA	40
Camp River Ranch	Girl Scouts of Western Washington	Carnation, WA	435
Bledsoe Family Forest	Paul Bledsoe	Olympia, WA	180
Lench Family Forest	Andrew Lench	Olympia, WA	40
Camp Sealath	Campfire USA	Vashon, WA	361
Bowling Family Forest	Bill & Debra Bowling	Albany, OR	34
Williamson Family Farm Trust	Lawrence Waldron	Stella, WA	102
Gopher Valley Botanicals	Jeanie Taylor	Sheridan, OR	20
Heartland Forest	George & Kelly Fleming	Langlois, OR	286

7. NNRG and our partners have used the results from this project to advance policy conversations regarding incentives for Oregon White Oak restoration, inform future engagement with carbon offset programs, and advocate for aggregation options.

To better understand the potential for more effective approaches to oak conservation in the Willamette Valley, Willamette Partnership undertook a study of existing policies and programs in Oregon related to oak conservation. The study examined state and federal agency-based programs and funding sources that could be harnessed to develop a policy that would improve the effectiveness of oak conservation and restoration in Oregon's Willamette.

Findings show that policy options for oak conservation are currently very limited. Despite the ecological value of Oregon White Oak and oak woodland and savannah habitat, and its continued loss, there remains a lack of coordinated effort at a regional or state level to protect and restore this habitat type. Primarily, the absence of any clear regulatory agency mandate to protect oak habitats, as well as the absence of quantified conservation goals and targets for oak (how much needs to be restored, to what quality and where?) are key barriers to the development of relevant oak conservation policy. Other practical barriers include competing land uses that are seen

as beneficial, limited economic return from oak habitats, the dominance of private land ownership of oak habitats, the relative high cost of conservation actions that mimic historic fire regimes as well as a number of competing conservation priorities.

There are, however, significant voluntary efforts underway in the Valley to improve the quality and quantity of oak habitat, including private landowner restoration of small, privately owned oak stands, Metro's OakQuest mapping and restoration program, among others. These types of efforts, coupled with leadership from a coalition of stakeholders and funding targeted to achieve specific conservation goals, hold promise for improving the long term sustainability of oak woodlands and savannas in the Valley.

8. Finally, while Climate Action Reserve has developed guidelines for aggregated forest carbon offset projects, this has yet to become a viable option for small forest owners. NNRG is currently working with two other conservation organizations, Ecotrust and the Pinchot Institute for Conservation, to leverage the results of this CIG project to explore use of the American Carbon Registry to overcome costs associated with carbon projects by aggregating forest owners. This fall, Pinchot Institute won a 2014 national CIG and Ecotrust won a 2014 Oregon State CIG to help further this collaboration.

The white papers, monitoring tools, and manuals developed by this project are all available at NNRG's website: nnrg.org/monitoring-your-forest/.

Conclusions and Recommendations

Small private forestland composes more than a third of the forests in the United States. As such, this group of forest owners plays an important role in the provision of ecosystem services such as water quality, carbon sequestration, and biodiversity. While various programs have been developed across the United States to incentivize management for ecosystem services, few are accessible to small private landowners because of associated costs. NNRG has worked to mitigate this obstacle by aggregating landowners for FSC certification, in addition to its pioneering NW Neutral program. This Conservation Innovation Grant project enabled NNRG to build on this previous experience and leverage the knowledge of other regional ecosystem services experts.

The three white papers that resulted from this project confirmed that carbon offset markets are currently the most relevant for small forest owners in Washington and Oregon, but that with current carbon credit prices, participating landowners would need 500 to 1,000 acres each to defray inventory and verification costs. This minimum acreage may be decreased further with a stronger carbon market, inventories that are implemented alongside previously planned timber cruises, and additional mechanisms to reduce inventory and verification costs. Other markets for ecosystem services are still limited in their applicability to small forest owners. Some opportunities may exist through water quality trading and riparian management.

The white papers also explain that, regardless of existing markets, measuring and monitoring the value of ecosystem services is crucial to establishing current baselines and feasible for small forest owners. The Willamette Partnership has developed several quantification tools through its Counting on the Environment program. Carbon can be assessed on forestlands in conjunction with timber cruises, and biodiversity can also be quantified with plot-based inventories. These techniques can be adapted for small forest owners through group aggregation, developing comprehensive inventories over time, or conducting more qualitative rapid assessments. Building on these white paper conclusions, the monitoring tools developed through this project include the carbon calculator that can be paired with timber inventories, and a biodiversity assessment form that serves as a simple rapid evaluation.

This project has made important progress on the issue of small private forest owner participation in ecosystem services markets. However, there is more work to do. The value of ecosystem services is still not represented by strong market prices, and policy is needed to develop those drivers. More options for small landowner aggregation need to be available and implemented in carbon markets. And finally, more private landowners need to be supported with education, outreach, and technical assistance to evaluate potential ecosystem services on their lands.

Appendices

NNRG created a series of webpages to host the information and resources developed through this project. The website provides an overview of forest monitoring, explains when and what to monitor, and integrates NNRG's existing monitoring protocols with those pertaining to ecosystem services.

The home page of the website is: **<http://nnrg.org/monitoring-your-forest>**

Links to the white papers, forms, manuals, and supplementary data developed for this project can be found here: **<http://nnrg.org/monitoring-your-forest/ecosystem-services>**